



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/585,326	07/06/2006	Harue Nakashima	0756-7732	9757
31780 7590 05/16/2011 Robinson Intellectual Property Law Office, P.C. 3975 Fair Ridge Drive Suite 20 North Fairfax, VA 22033			EXAMINER BOHATY, ANDREW K	
			ART UNIT	PAPER NUMBER
			1786	
			MAIL DATE	DELIVERY MODE
			05/16/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/585,326

Applicant(s)

NAKASHIMA ET AL.

Examiner

Andrew K. Bohaty

Art Unit

1786

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 April 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 29-31, 33, 50-52, 55 and 57-62 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 29-31, 33, 50-52, 55 and 57-62 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-946)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 2011/04/14
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. This Office action is in response to the amendment filed April 14, 2011, which amends claims 29, 30, and 55, cancels claim 56, and adds claims 61 and 62. Claims 29-31, 33, 50-52, 55, and 57-62 are pending.

Response to Amendment

2. Applicant's amendment of the claims and cancellation of the claims, filed April 14, 2011, has caused the withdrawal of the rejection of claims 29-31, 33, 50-52, and 55-60 under 35 U.S.C. 103(a) as being unpatentable over Raychaudhuri et al. (US 2004/0222737) in view of Liu et al. (Synthetic Metals 2004, 146, 85-89), Hosokawa (US 6,660,410), and Thomas et al. (Journal of the American Chemical Society, year 2001, volume 123, pages 9404-9411) as set forth in the Office action mailed January 14, 2011.

Response to Arguments

3. Applicant's arguments with respect to claims 29-31, 33, 50-52, and 55-60 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 51 and 57 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.
6. Regarding claims 51 and 57, the specification does support the presence of the carbazole compound being the guest material in the light emitting layer, but the specification does not further support the presence of a phosphorescent dopant as an additional dopant in the light emitting dopant when the carbazole compound is already being used as a dopant in the layer.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

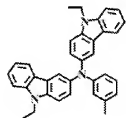
8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 29, 30, 33, 50, 55, 58, 61, and 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatwar et al. (US 2004/0185300) (hereafter "Hatwar") in view of Liu et al. (Synthetic Metals 2004, 146, 85-89) (hereafter "Liu") and Thomas et al. (Journal of the American Chemical Society, year 2001, volume 123, pages 9404-9411) (hereafter "Thomas").

10. Regarding claims 29, 30, 55, and 58, Hatwar teaches a light emitting element comprising in order an anode, a hole injection layer in contact with the anode, a hole transporting layer in contact with the hole injection layer, a light emitting layer in contact with the hole transporting layer, and a cathode over the light emitting layer (Fig. 3 paragraph [0109]). Hatwar teaches the light emitting layer is composed of a host material and a blue dopant (paragraphs [0059]-[0070]). Hatwar teaches that any known blue dopant can be used in this layer (paragraph [0070]).

11. Hatwar does not teach where the blue dopant is a carbazole dopant that meets the applicant's claimed guest material.



12. Liu teaches a carbazole compound with the following structure, (DECMA, page 86 right column), which reads on applicant's formula (1), where R¹² and R¹⁴ are hydrogen and Ar¹¹ is m-tolyl. Liu teaches that these carbazoles can be used in light emitting elements and can be found in the light emitting layer and emits blue light (page 87 right column first paragraph under heading 3.2 Optical properties of DECMA).

Liu teaches that DECMA would be usefully as a blue dopant because it has a good purity because of its narrow full-width at half-maximum (page 87 right column first paragraph under heading 3.2 Optical properties of DECMA).

13. Thomas teaches a light emitting element comprising a carbazole compound (abstract). Thomas teaches the carbazole compounds can be used in the light emitting layer and contains light emitting properties (page 9404 right compound paragraph at beginning of column). Thomas further teaches that when the N position on a carbazole group is changed from an alkyl group to an aryl group, the emission wavelength of the material is blue shifted (page 9407 Table 1 compounds 9 and 10 and 11 and 12).

Thomas teaches that one can blue shift the carbazole material by changing an ethyl group that is attached to the N position on the carbazole to an aryl group (page 9407 Table 1).

14. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the carbazole compound (DECMA) of Liu so the ethyl groups were changed to phenyl groups. The motivation would have been to blue shift the material.

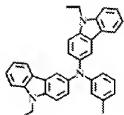
15. Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the blue light emitting layer of Hatwar so the modify compound of Liu was used as the dopant. Hatwar teaches that any blue dopant can be used and Liu teaches that DECMA is a good blue dopant because of it has good color purity; therefore, it would have been obvious to one of ordinary skill in the art to use the modify Liu compound as the blue light emitting dopant.

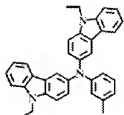
16. Regarding claims 33, 50, 61, and 62, Hatwar teaches the light emitting element can be used in a light emitting device and the device can be used in a lighting system (paragraph [0005]).

17. Claims 29, 30, 33, 50, 51, 55, 57, 58, 61, and 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa et al. (US 2004/0124766) (hereafter "Nakagawa") in view of Liu et al. (Synthetic Metals 2004, 146, 85-89) (hereafter "Liu") and Thomas et al. (Journal of the American Chemical Society, year 2001, volume 123, pages 9404-9411) (hereafter "Thomas").

18. Regarding claims 29, 30, 55, and 58, Nakagawa teaches a light emitting element comprising in order an anode, a hole injection layer in contact with the anode, a hole transporting layer in contact with the hole injection layer, a light emitting layer in contact with the hole transporting layer, and a cathode over the light emitting layer (paragraphs [0082], [0083], and [0092]). Nakagawa teaches the light emitting layer can be composed of a host material and a blue dopant (paragraphs [0141]-[0159]). Nakagawa teaches that any known blue dopant can be used in this layer (paragraphs [0156]-[0158]).

19. Nakagawa does not teach where the blue dopant is a carbazole dopant that meets the applicant's claimed guest material.



20. Liu teaches a carbazole compound with the following structure, , (DECMA, page 86 right column), which reads on applicant's formula (1), where R^{12} and R^{14} are hydrogen and Ar^{11} is m-tolyl. Liu teaches that these carbazoles can be used in light emitting elements and can be found in the light emitting layer and emits blue light (page 87 right column first paragraph under heading 3.2 Optical properties of DECMA). Liu teaches that DECMA would be usefully as a blue dopant because it has a good purity because of its narrow full-width at half-maximum (page 87 right column first paragraph under heading 3.2 Optical properties of DECMA).

21. Thomas teaches a light emitting element comprising a carbazole compound (abstract). Thomas teaches the carbazole compounds can be used in the light emitting layer and contains light emitting properties (page 9404 right compound paragraph at beginning of column). Thomas further teaches that when the N position on a carbazole group is changed from an alkyl group to an aryl group, the emission wavelength of the material is blue shifted (page 9407 Table 1 compounds 9 and 10 and 11 and 12). Thomas teaches that one can blue shift the carbazole material by changing an ethyl group that is attached to the N position on the carbazole to an aryl group (page 9407 Table 1).

22. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the carbazole compound (DECMA) of Liu so the ethyl

groups were changed to phenyl groups. The motivation would have been to blue shift the material.

23. Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the light emitting layer of Nakagawa so the modify compound of Liu was used as the blue dopant. Nakagawa teaches that any blue dopant can be used and Liu teaches that DECMA is a good blue dopant because of it has good color purity; therefore, it would have been obvious to one of ordinary skill in the art to use the modify Liu compound as the blue light emitting dopant.

24. Regarding claims 51 and 57, Nakagawa teaches the light emitting layer can include further dopants and the dopants can be phosphorescent materials, (paragraphs [0133]-[0135], [0154], and [0163]).

25. Regarding claims 33, 50, 61, and 62, Nakagawa teaches the light emitting element can be used in light emitting devices and these devices emit white light emit and can be used in a full-color display (a lighting system) (paragraphs [0001] and [0053]).

26. Claims 31, 52, 59, and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatwar et al. (US 2004/0185300) (hereafter "Hatwar") in view of Liu et al. (Synthetic Metals 2004, 146, 85-89) (hereafter "Liu") and Thomas et al. (Journal of the American Chemical Society, year 2001, volume 123, pages 9404-9411) (hereafter "Thomas") as applied to claims 29, 30, 33, 50, 55, 58, 61, and 62 above, and further in view of Raychaudhuri et al. (US 2004/0222737) (hereafter "Raychaudhuri").

27. Regarding claims 31, 52, 59, and 60, Hatwar teaches the light emitting element comprises a hole injection layer and the layer can be composed of any known hole injection material (paragraph [0040]).

28. Hatwar in view of Liu and Thomas does not teach where the hole injection layer is composed of VO_x or MoO_x .

29. Raychaudhuri teaches a light emitting device comprising a light emitting element comprising an anode, a hole injecting layer over and in contact with the anode, a hole transporting layer over the hole injecting layer, a light emitting layer over and in contact with the hole transporting layer, and a cathode of the light emitting layer (Fig. 1 paragraph [0028]). Raychaudhuri teaches the hole injecting layer can be composed of MoO_x (paragraph [0031]). Raychaudhuri teaches that MoO_x provides efficient hole injection from the anode to the hole transporting layer of the light emitting element (paragraph [0031]).

30. It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the hole injection material of Hatwar in view of Liu and Thomas for MoO_x as taught by Raychaudhuri. The substitution would have been one known hole injection material for another and would lead to the predictable results of using MoO_x as the hole injection material in a light emitting element.

31. Claims 31, 52, 59, and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakagawa et al. (US 2004/0124766) (hereafter "Nakagawa") in view of Liu et al. (Synthetic Metals 2004, 146, 85-89) (hereafter "Liu") and Thomas et al.

(Journal of the American Chemical Society, year 2001, volume 123, pages 9404-9411) (hereafter "Thomas") as applied to claims 29, 30, 33, 50, 51, 55, 57, 58, 61, and 62 above, and further in view of Raychaudhuri et al. (US 2004/0222737) (hereafter "Raychaudhuri").

32. Regarding claims 31, 52, 59, and 60, Nakagawa teaches the light emitting element comprises a hole injection layer and the layer can be composed of any known hole injection material (paragraphs [0099]-[0111]).

33. Nakagawa in view of Liu and Thomas does not teach where the hole injection layer is composed of VO_x or MoO_x .

34. Raychaudhuri teaches a light emitting device comprising a light emitting element comprising an anode, a hole injecting layer over and in contact with the anode, a hole transporting layer over the hole injecting layer, a light emitting layer over and in contact with the hole transporting layer, and a cathode of the light emitting layer (Fig. 1 paragraph [0028]). Raychaudhuri teaches the hole injecting layer can be composed of MoO_x (paragraph [0031]). Raychaudhuri teaches that MoO_x provides efficient hole injection from the anode to the hole transporting layer of the light emitting element (paragraph [0031]).

35. It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the hole injection material of Nakagawa in view of Liu and Thomas for MoO_x as taught by Raychaudhuri. The substitution would have been one known hole injection material for another and would lead to the predictable results of using MoO_x as the hole injection material in a light emitting element.

Conclusion

36. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

37. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

38. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew K. Bohaty whose telephone number is (571)270-1148. The examiner can normally be reached on Monday through Thursday 8:00 am to 5:30 pm EST and every other Friday from 8:00 am to 4:30 pm EST.

39. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer Chriss can be reached on (571)272-7783. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

40. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. K. B./
Andrew K. Bohaty
Patent Examiner, Art Unit 1786

/Dawn L. Garrett/
Primary Examiner, Art Unit 1786